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THE AMERICAN MUSEUM JOURNAL



Volume VIII

December, 1908

Number 8

Published monthly from October to May inclusive by
THE AMERICAN MUSEUM OF NATURAL HISTORY
NEW YORK CITY

American Museum of Natural History
Seventy-seventh Street and Central Park West, New York City

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THE AMERICAN MUSEUM OF NATURAL HISTORY was established in 1869 to promote the Natural Sciences and to diffuse a general knowledge of them among the people, and it is in cordial cooperation with all similar institutions throughout the world. The Museum authorities are dependent upon private subscriptions and the dues from members for procuring needed additions to the collections and for carrying on explorations in America and other parts of the world.

The membership fees are,

Annual Members.....	\$ 10	Fellows.....	\$ 500
Life Members.....	100	Patrons.....	1000

All money received from membership fees is used for increasing the collections and for developing the educational work of the Museum.

The Museum is open free to the public on every day in the year.





SKELETON OF THE RACE HORSE "SYSONBY."

Presented by James. R. Keene. Prepared and mounted by S. H. Chubb.

The American Museum Journal

VOL. VIII

DECEMBER, 1908

No. 8

EXHIBIT ILLUSTRATING THE EVOLUTION OF THE HORSE.

ON Friday, November 13, there was opened in the Hall of Fossil Mammals a special exhibit illustrating the evolution of the horse, at which was given the first public view of the mounted skeleton of the celebrated horse "Sysonby."

Sysonby was one of America's most famous race horses. He was foaled, February 7, 1902, at Mr. James R. Keene's Castleton stud in Kentucky, a few months after the importation from England of his dam "Optime," his sire being "Melton," also English bred. Sysonby's record is one of the most brilliant in the history of American horse racing. He won a remarkable series of victories between his first race at Brighton Beach, July 14, 1904, as a two-year old, and his death at four years of age (June 17th, 1906). Mr. Keene generously presented the skeleton to the Museum and provided for its preparation and installation.

The mount represents a characteristic phase in the stride of a running horse and was prepared by Mr. S. H. Chubb under the direction of Professor Henry Fairfield Osborn, the work being based upon direct observation and instantaneous photographs of Sysonby and other race horses taken by E. Muybridge, J. C. Hemment and S. H. Chubb. The position is that taken the moment after the right fore foot has left the ground, and the right "knee," or carpus, is beginning to bend; the succeeding foot-falls in order are, left hind foot, right hind foot, left fore foot, right fore foot. The length of a complete stride is about 26 feet.

At this instant the hind quarters and limbs are lifted perceptibly higher than the shoulders, and from a rear view it will be seen that, while the hind feet are thrust forward at a great height from the ground, they are widely separated from each other so as to avoid striking the fore legs. A moment later the shoulders will be lifted by the push of the fore foot higher than the hind quarters, then the hind feet will move toward the median line and strike the ground, while the fore feet will move forward out of the way of the hind.

The back bone is slightly arched to help draw together the fore and hind limbs and feet, and thus lengthen the stride and bring the back muscles into play. When viewed from above, the back bone is also observed to be curved a little to the right, owing to the forward position of the left side of the pelvis and of the left hind limb; this also lengthens and gives power to the stride as the back bone is straightened.

The American Museum has made a specialty of the study of the evolution of the Horse, as one of the most striking and best known examples of evolution, and the present exhibit two phases of it: First, the Evolution of the Horse in Nature, showing how and why the horse came into existence; Second, the Evolution of the Horse under Domestication, showing the different races which have been evolved by man through selection and breeding.

The first phase is illustrated by the series of fossil ancestors of the horse in successive geological epochs. These are represented by complete skeletons of nine stages in the ancestry of the Horse, and numerous skulls and parts of skeletons showing every intermediate gradation from the earliest ancestor, no larger than a terrier dog, to the modern descendants. These are chiefly from the "badlands" of the arid Western States, where the most complete and abundant remains of fossil horses have been found. The specimens on exhibition in the Museum are arranged to show the gradual development of the peculiar characteristics which distinguish the horse from other animals, and especially the adaptations to swift running over the open plains which are the natural habitat of the animal. With each skeleton is placed a restoration showing the probable appearance and natural surroundings of the animal during life. The exhibit is further illustrated by models, diagrams and special series showing the evolution of certain parts of the skeleton.

The restorations of extinct horses have been made by the well known animal painter, Mr. Charles R. Knight, under the supervision of Professor Osborn. All the modern species of wild horse are also represented by careful paintings from life by Mr. Knight.

The second phase, the evolution of the horse under domestication, is illustrated by a number of skeletons of different races of the horse, mounted with especial care and accuracy in correct and characteristic positions. The smallest race is the Shetland pony, the largest the great Percheron draught horse. The true Arabian horse is represented, and the latest addition to the series is the racer Sysonby. One of the most

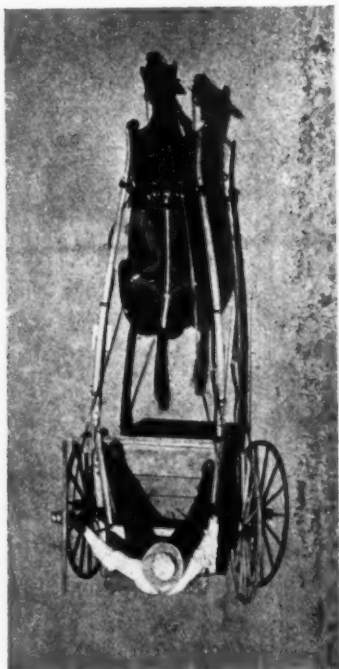
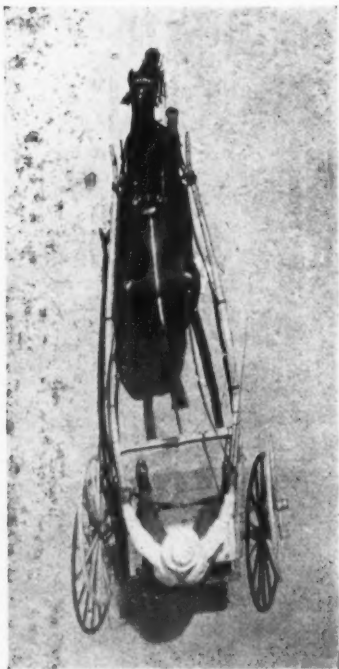


PHOTOGRAPHING A RACE HORSE RUNNING AT FULL SPEED.

At the American Museum of Natural History.

striking mounts in the Horse Alcove is that of the rearing horse and man, showing the domination of man over this powerful animal through superior intelligence, in spite of relatively slight physical strength.

The American Museum collections of fossil horses are larger than those of all other museums put together, but only a small part are on exhibition, by far the greater part being in the study collections on the top floor, accessible to scientific students. Here there are preserved



RUNNING RACE HORSE IN ACTION.

Instantaneous photograph taken from apparatus shown on page 119.

hundreds of skulls and partial skeletons, thousands of jaws and tens of thousands of teeth and bones. They come from all parts of the world where fossil horses have been found, but chiefly from the western bad lands. Some have been obtained by exchange with other museums or by purchase, but the greater part has been collected by expeditions which have been sent out year after year since 1891.

Among the notable specimens in the series of ancestors of the horse are

(1) The earliest Four-toed Horse, *Eohippus*, from the collection of the late Professor E. D. Cope, purchased by the Museum in 1894. This unique specimen was found in a Lower Eocene formation of Wyoming in 1880 by J. L. Wortman and has long been well known to scientists.

(2) A second later stage of the Four-toed Horse, *Orohippus*, repre-



SYSONBY AT FULL SPEED.

From model prepared by E. S. Christman.

sented by the only skeleton ever discovered. This was found by Walter Granger of the American Museum expedition of 1905 in southwestern Wyoming. It is but little larger than the *Eohippus*, but it shows a certain advance toward the horse type especially in the teeth and feet.

(3) Three complete skeletons of the early Three-toed Horses, *Mesohippus*, showing successive increase in size, and a further advance toward the horse type in all details of structure; this is especially noticeable in the teeth and feet. These skeletons are from the Big Bad Lands

of South Dakota, and were discovered by J. W. Gidley, H. F. Wells and the American Museum expedition of 1894.

(4) A skeleton of the Three-toed Forest Horse, *Hypohippus*, from the Middle Miocene of Colorado, collected by Barnum Brown of the American Museum expedition of 1901. This is not a direct ancestor of the modern horse, but is a nearly related type, adapted to a forest country.

(5) A skeleton of the Three-toed Desert Horse *Neohipparion* from the Upper Miocene of South Dakota, obtained by H. F. Wells of the American Museum expedition of 1902. This very perfect skeleton represents the last stage of development of the three-toed horses before the side toes disappeared.

(6) A skeleton of the true native American Horse, *Equus Scotti*, extinct since the Pleistocene Epoch. This fine skeleton was found in Texas by J. W. Gidley of the American Museum expedition of 1899. It is very much like the domesticated horse and equals it in size, but has in certain respects the proportions of a zebra. Wild horses were unknown in America when discovered by white men, though they had formerly been abundant. Why they became extinct no one knows.

The Museum Expedition of last summer (1908) in Western Nebraska obtained a large and interesting collection of Three-toed Horses. The most important find was a bone bed containing thousands of jaws, teeth and fragments, principally of horses, but also including a great variety of other animals, some fifty or sixty species in all. These appear to be of Pliocene age, representing an intermediate stage, hitherto very little known in this country, between the Three-toed Horses of the Miocene and the One-toed Horses of the Pleistocene. It is hoped that further work in this interesting deposit will bring to light more complete specimens. Several incomplete skeletons of Three-toed Horses from the Middle and Lower Miocene formations of Western Nebraska were also secured, besides a fine series of skeletons and other remains of camels, rhinoceroses and other forms.

One feature of the American Museum Fossil Horse collections of especial value to scientists is that it includes practically all the type specimens from which the various species have been described, either the original specimens or carefully executed plaster casts. It is intended to make this series absolutely complete, so that students desiring to compare or identify specimens will find here everything that has been described, and by consulting the library, can find out all that has been said about it.

DEPARTMENT OF MINERALOGY.

THROUGH Edward L. Dufoureaq, the President and the Board of Directors of the Minas Pedrazzini Company at Arizpe, Sonora, Mexico, have presented to the mineral cabinet a very remarkable specimen of crystallized Polybasite. This ore of silver (sulphantimonide of silver with some of the silver replaced by copper) furnishes a large part of the vein material from which the silver is obtained in this very productive mine. At favorable points there have developed beautifully crystallized specimens of the mineral upon a scale of magnitude almost unique. The entire mass as forwarded consisted of a crystallized surface, displaying small and large crystals, nestling upon an ore body of considerable size. The value in bullion of this unusual aggregate was \$640 (\$1280 Mexican), and it probably was the largest mass of Polybasite ever taken from a mine entire. It suffered breakage in transit and separated into two specimens which were still of great value. Fortunately these were contrasted in character, since one contains the great tabular crystals (3 inches across) of Polybasite, and the other less unusual smaller crystals, intersecting and merged in the more irregular mass beneath. While the breaking of the specimen is most regrettable, the splendor of the large crystals becomes perhaps more imposing by this removal from their smaller and less significant associates. The crystals are six-sided plates of the orthorhombic system, slightly protuberant in the center and sharply striated or ruled. They intersect at nearly right angles, making a cellular box-like structure that seems to be characteristic, since a similar disposition is observed in the smaller crystals.

Some interesting minerals from the famous Broken Hill mines of New South Wales have been purchased through the Bruce endowment. This locality, which has furnished so many superb mineral examples to collections, notably specimens of Stolzite (lead tungstate), Cerussite, Anglesite, Azurite, with crystallized Cerargyrite, Embolite, and the very rare Minersite, has been largely exhausted, but a Mrs. Slee, the widow of a mining engineer employed in the mines, brought to this city a group of valuable specimens, representing a collection made by her husband. These mines are situated in the Silverton District and Barrier Ranges of New South Wales and have at some points yielded extraordinary

bullion values of silver. In one case 48 tons of a ferruginous matrix yielded 37,000 ounces of silver, and in another case 1300 ounces of silver per ton was reported. The rare haloid compounds of silver have been found in these ores, as crystallized Cerargyrite, Embolite, Iodyrite, Bromyrite (?), and from the collection exhibited in New York a wonderfully large Iodyrite (silver iodide) was obtained. The soft, waxy, greenish crystals are hexagonal prisms and are very large, surpassing any examples previously contained in the mineral collection. Crystallized brown Embolite (chloro-bromide of silver) implanted upon black velvety stalactites of Limonite was found in the series, and exquisite specimens have been added to our collection.

Other additions, less notable, have been secured through the Bruce Fund, which still forms an invaluable means for the enrichment of the mineral collection.

L. P. G.

MUSEUM NEWS NOTES.

AT the quarterly meeting of the Board of Trustees held Monday, November 9, the following action was taken with regard to certain gifts to the collections of the Museum:

The HON. MASON MITCHELL, formerly Consul at Chung-king, China, was elected a Patron in recognition of his gift of ethnological material from Tibet and mammal skins from China.

MR. HENRY BOOTH of Poughkeepsie, New York, was elected a Patron on account of the gift of an extensive collection of material representing the archæology of Dutchess, Columbia, Putnam and Ulster Counties, New York.

DR. WALTER CHANNING of Brookline, Massachusetts, was elected a Patron on account of his gift to the Museum of a large collection of plaster casts from the hard palates of feeble-minded and normal human beings.

MR. T. E. DONNE of Wellington, New Zealand, was made a Life Member in recognition of his recent important additions to previous gifts of Maori material.

MRS. ARMAR D. SAUNDERSON was elected a Life Member on account of the gift of specimens of the Bongo Antelope and the Bush Pig of Africa.

MR. CHARLES H. TOWNSEND, Director of the New York aquarium, was made a Life Member in recognition of his gift of mounted specimens of birds from Alaska and ethnological material from the South Sea Islands.

PROFESSOR WM. MORTON WHEELER was elected a Patron in recognition of his gift of a collection of Formicidæ, and was made Honorary Curator of Social Insects.

PROFESSOR BASHFORD DEAN was elected an Honorary Fellow because of gratuitous services during the past five years to the Department of Vertebrate Palæontology, especially in respect to the collection of fossil fishes.

IN addition to those just named the following new members have been elected since the last issue of the Journal: Life Members, MRS. TEMPLE BOWDOIN, MRS. V. EVERIT MACY, EDWIN SWIFT BALCH, JACOB LANGELOTH; Annual Members, MRS. WM. B. OSGOOD FIELD, REV. HUGH BIRCKHEAD, C. LEDYARD BLAIR, DR. CHRISTIAN A. HERTER, RT. REV. DAVID H. GREER, DR. WM. M. POLK, SAMUEL SLOAN, JR., MRS. J. A. SCRYMSER, MRS. WALTER B. JAMES, BENJAMIN DOUGLASS, JR., MRS. DOUGLAS ROBINSON, EDWIN R. A. SELIGMAN, DR. N. L. BRITTON, HOWARD RUSSELL BUTLER, CHARLES H. STERNBERG, RICHARD TJÄDER, JOHN C. PENNINGTON, MRS. LEVI P. MORTON, D. H. PIERSON, DR. GEORGE ROE LOCKWOOD, CHARLES H. PLATT, G. L. MORGENTHAU, MRS. LEONARD E. OPDYCKE, DR. L. PUTZEL, WILLIAM S. COFFIN, HARRY S. SEELEY, MRS. JAMES SULLIVAN.

AN important announcement was made at the 'Trustees' meeting of the gift by Mr. D. O. Mills to the Department of Mammalogy of eight specimens of the fur seal, to be utilized in the preparation of a group illustrating a seal rookery. The specimens were collected at the Pribilof Islands, Alaska, expressly for the Museum, by order of Mr. Mills, who had special permission from the Department of Commerce and Labor for their capture. The series consists of male seals two, three, five and seven years old, female seals three and four years old and two pups six weeks old.

THE series of several thousand plaster casts of the palates of feeble-minded and normal children and adults by Dr. Walter Channing recently presented to the Museum forms an important addition to our physical anthropological collections, serving as comparative material of great value in the study of racial characters. The series is available to students upon application.

MR. G. S. BOWDOIN has presented to the Museum one of the elaborate feather capes for which the Hawaiian Islands have been famous. This specimen is one of the most perfect examples known and forms an extremely desirable addition to the collection of the Department of Anthropology.

PROFESSOR WM. MORTON WHEELER has presented to the Museum his entire collection of Formicidæ, which is the largest in this country and one of the three largest in the world. This collection represents such a large portion of the extensive family Formicidæ that all future additions can be readily interpolated in it. Nearly every species in the collection is represented by long series of specimens (often many hundreds in number) and includes many types, co-types and unique specimens.

THE Museum suffers serious loss through the acceptance by Professor Wm. Morton Wheeler of the appointment to the professorship of Economic Entomology in Harvard University. Professor Wheeler's headquarters and laboratory will be at the Bussey Institution, which is located in Forest Hills, Boston, Mass., where he will have exceptional opportunity for carrying on research work as to the life history of insects inimical to forest trees.

MR. G. FREDERICK NORTON, a member of the expedition accompanying Commander Peary to the Arctic Regions last summer, has presented to the Museum a valuable series of ethnological specimens from the Eskimo of Disco Island and Holstenborg, South Greenland. The series consists of an unusually good kayak, or native hunting boat, about sixteen feet long; harpoons, harpoon points and seal skin floats; lines and throwing boards; a paddle; swivel; line receptacle and seal skin boots and pants.

EXHIBITS illustrating concretely the acorn, salmon and other industries of the Indians of California have recently been installed in the Hall of North American Types (No. 102 of the Ground Floor).

Two important additions to the series of North American habitat groups have recently been completed. These are the Duck Hawk group, representing a scene along the Palisades of the Hudson River, and the Hackensack Meadow group, which represents a section of this familiar range and the nesting habits of the birds which frequent it in August.

THE fall exhibition of the Horticultural Society of New York was held at the Museum November 17-20. The number of entries was large, and the display of cut flowers and potted plants was most attractive, particularly in the classes of chrysanthemums, orchids and carnations.

THREE floors of the new Columbus Avenue wing of the Museum have been set aside for the exhibition made by the Committee on the Prevention of Tuberculosis of the Charity Organization Society of New York, temporary stairways having been installed, so that ready access is had from one floor to the next. This exhibition aroused widespread interest during the time that it was held in connection with the recent International Tuberculosis Congress at Washington, and it is evident that it will attract even more attention and be visited by more people, while it is on view at the Museum. The exhibition is open free to the public during the usual hours and will continue for several weeks. Entrance to it may be had through the temporary doorway at the north end of the new wing, at the corner of Columbus Avenue and Seventy-ninth Street, as well as through the usual public entrance on Seventy-seventh Street.

LECTURE ANNOUNCEMENTS.

MEMBERS' COURSE.

Thursday evenings at 8:15 o'clock. Doors open at 7:45 P. M.

December 3.—HENRY E. CRAMPTON, "Tahiti and the Society Islands."

December 10.—NATHANIEL L. BRITTON, "Some Native Trees, Their Flowers and Fruits."

(The Members of the New York Botanical Society will be the guests of the Museum on this evening.)

December 17.—ROY C. ANDREWS, "Whale Hunting with a Camera."

PUPILS' COURSE.

THESE lectures are open to the pupils of the public schools when accompanied by their teachers and to the children of Members of the Museum on the presentation of Membership tickets.

Lectures begin at 4 P. M.

- Dec.
 Wednesday, 2.—“Hiawatha's' People.” By HARLAN I. SMITH.
 Friday, 4.—“Industries of the United States.” By ROY W. MINER.
 Monday, 7.—“Among the Filipinos.” By ROY C. ANDREWS.
 Wednesday, 9.—“Physical Geography from Pictures.” By EDMUND OTIS HOVEY.
 Friday, 11.—“Home Life of American Birds.” By FRANK M. CHAPMAN.

LEGAL HOLIDAY COURSE.

OPEN free to the public. Fully illustrated. No tickets required.

Lectures begin at 3:15 P. M. Doors open at 2:45 P. M.

Thanksgiving Day, November 26.

“Mt. Pelé, Martinique, in 1902, 1903 and 1908,—the History of a Great Volcano. The Destruction of St. Pierre.” By EDMUND OTIS HOVEY.

Christmas Day, December 25.

“Whale Hunting with a Camera.” By ROY C. ANDREWS.

New Years Day, January 1, 1909.

“Florida Bird Life.” (Illustrated with moving pictures.) By FRANK M. CHAPMAN.

Washington's Birthday, February 22, 1909.

“The Food and Game Fishes of the Eastern United States,—Habits and Methods of Capture.” By ROY W. MINER.

COLUMBIA UNIVERSITY COURSE.

JESUP LECTURES.

GIVEN in coöperation with Columbia University.

Wednesday evenings at 8:15 o'clock.

Continuation of a course of lectures on light by PROFESSOR RICHARD C. MACLAURIN of Columbia University.

December 2.—“Dispersion and absorption of light. Recent theories. Electrons.”

- December 9.—“Spectroscopy. Applications to chemistry and astronomy.”
December 16.—“Polarization, with some applications to chemistry and molecular physics.”
January 6.—“The exact laws of reflection and refraction and their bearing on the construction of optical instruments.”
January 13.—“Optical properties of crystals.”
January 20.—“The principle of interference and its explanation of various color phenomena.”
January 27.—“The measurement of light waves and the theory of diffraction.”
February 3.—“Some relations between light and electricity.”

PEOPLE'S COURSE.

GIVEN in coöperation with the City Department of Education.

Saturday evenings at 8 o'clock. Doors open at 7:30.

PROFESSOR BRADLEY STOUGHTON of Columbia University,—a course of lectures on metallurgy, illustrated by experiments and stereopticon views.

- December 5.—“The Uses of Iron and Steel in Machine Shops and Bridges and other great Engineering Structures.”
December 12.—“The Rolling and Forging of Iron and Steel.”
December 19.—“The Heat Treatment of Steel.”

Tuesday evenings at 8 o'clock. Doors open at 7:30.

MR. CHARLES M. PEPPER, of the Department of Commerce and Labor,—illustrated lectures on “The Twentieth Century South America.”

- December 1.—“Argentine, the World's Wheatfield.”
December 8.—“The Vastness of Brazil.”
December 15.—“Colombia and the Andes.”

Children are not admitted to the lectures of the People's Course, except on presentation of a Museum Member's Card.

MEETINGS OF SOCIETIES.

Public meetings of the New York Academy of Sciences and Affiliated Societies are held at the Museum according to the following schedule:

- On Monday evenings, The New York Academy of Sciences:
First Mondays, Section of Geology and Mineralogy.
Second Mondays, Section of Biology.

Third Mondays, Section of Astronomy, Physics and Chemistry.

Fourth Mondays, Section of Anthropology and Psychology.

On Tuesday evenings, as announced:

The Linnaean Society, The New York Entomological Society and
The Torrey Botanical Club.

On Wednesday evenings, as announced:

The New York Mineralogical Club.

On Friday evenings, as announced:

The New York Microscopical Society.

The programmes of the meetings of the respective organizations are published in the weekly *Bulletin* of the New York Academy of Sciences and sent to the members of the several societies. Members of the Museum on making request of the Director will be provided with the *Bulletin* as issued.

The American Museum Journal

EDMUND OTIS HOVEY, *Editor*.

FRANK M. CHAPMAN,
LOUIS P. GRATACAP, } *Advisory Board*.
WILLIAM K. GREGORY, }

Subscription, One Dollar per year. Fifteen Cents per copy.

A subscription to the JOURNAL is included in the membership fees of all classes of Members of the Museum.

Subscriptions should be addressed to The American Museum Journal, 30 Boylston St., Cambridge, Mass., or 77th St. and Central Park West, New York City.

Entered as second-class matter January 12, 1907, at the Post-office at Boston, Mass.
Act of Congress, July 16, 1894.

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FOR EDUCATION
FOR SCIENCE

